

# A Summer Field-Biology Course For High School Beginners

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High school biology teachers often wish they could do more teaching of field biology. Because of the number of students, short class time (45 minutes to an hour), and lack of personal knowledge of life in the community of plants and animals, most teachers consider it impossible to do much work with biology students in the outdoors. However, during the regular school year a field course might be set up for advanced-biology students by scheduling a double period of biology on certain days each week. This could solve the numbers problem, because there usually are fewer students in an advanced-biology course than in a first-year course. The time problem would also be lessened by scheduling double periods.

Advanced-biology students probably already have an interest in biology (or they would not be taking a second course); but it is well worth considering how to work out a field-biology course for first-year students to help them develop a keen interest in biology. What better way is there to develop their interest in conservation and in providing for the generations to enjoy outdoor recreation? At the same time they can learn at first hand the anatomy, physiology, and ecology of organisms in their own environment.

Development and instigation of a summer course in field biology will allow the teacher to overcome the problem of numbers and time.

## Who Shall Take the Course?

Rock Island High School, with courses already established in required elementary biology and elective advanced biology, initiated a field biology course last summer for beginning-biology students

entering the 10th grade. Thirty students were allowed to take the course for six weeks of summer school from 8 a.m. until noon daily, Monday through Friday. Since poorer students as well as better students may gain much from first-hand experience, selection of students for the course was based on order of registration rather than on ability of students. Each of the four junior high schools in the system was allowed a quota, based on its total ninth-grade enrollment. If the quota for one junior high school was six students, then the first six students from that junior high to fill out and hand in a pre-registration form, plus a deposit fee toward summer-school payment, were allowed to take the course.



Fig. 1. Under an oak tree—or is it a sweet gum?

If one student dropped out before the course began, the next student from that junior high was allowed to take the course. While this allowed students at all levels of ability to take the field-biology class, we found that the class was above average—perhaps because above-average students are more interested in taking summer school work.

### Teacher Ratio and Time Allotment

To have a desirable situation for learning in the field, the number of students per instructor should be as low as possible. We felt before and after this course that there should be no more than 15 students per teacher; therefore we had two teachers and a class limit of 30 students. It was our good fortune to have two student teachers who were experienced teachers in need of student teaching to meet certification requirements. With the student teachers we could break the field groups down to four groups of 7 and 8 or three groups of 10. This ratio was ideal.



Fig. 2. It's wet work but they love it.

Three out of five days a week were scheduled for the field. To allow bus scheduling, definite days were established for each trip. Alternate (rain-out) dates were also set up. The other two days each week were used for lab work that made use of some of the materials collected from the field; or the time was given over to lectures, films, or testing.

### Subjects for Field Study

Our studies began close to home: on campus and in a local park. In these places we learned to use keys for the classification of lawn plants and trees. In these first days the students were exposed to an exciting variety of local plants and animals. Uses of plants as human or wildlife food were pointed out, in addition to their basic ecological role as producers, consumers, and places for shelter. Useful adaptations, such as thorns (gooseberry, locust) and poisonous oils (poison ivy), were pointed out. Arthropods and birds were the animals stressed in

the first days. Arthropods were chosen because of their vast numbers and economic importance; birds, because of their role in the control of arthropods and because the Rock Island region, with its woods, rivers, and marshes, is the home of a variety of birds. Birds are excellent, too, for a study of adaptations (feet, beaks).

After an introduction to local plant and animal life, students carried on a quadrat study in a park. The quadrat followed a line from stream to open lawn to deep woods. Analysis was made of the variation of life found in these different habitats.

To save on bus expenses, parents were asked to take their students to local parks and pick them up there. All other trips were by bus.

After two weeks of study of local plants and animals in lawns and wooded areas, the class took up the study of aquatic life. A comparison was made between life in still water (pond) and life in flowing water (stream). Rate of flow, depth of water, turbidity, and temperature were measured. We used three borrowed canoes to take out part of the group each time, while the rest of the group used seines and nets to collect and observe life in shallow waters. A plankton net was towed behind one of the canoes to collect plankton for microscopic examination in the lab the next day. During the third week of study a trip was made to a nearby fish hatchery, where the operation was explained and we saw catfish eggs collected, treated, and aerated.

Permission for collecting was obtained from the proper authorities before making the field trips; and, since the course stressed conservation, students were frequently impressed to put logs and stones back in place after removing them for study or collecting purposes. Students were also reminded to collect only specimens that were numerous and only as many as were needed for study purposes.

### Project Reports

After studying life in a variety of habitats for the first three weeks, students were required to choose an independent field project. A list of suggested projects was provided, but students were allowed to use their own ideas. All projects had to be approved, as to feasibility, by the instructors. Project work extended over a period of two and one-half weeks. All project material was handed in during the final (sixth) week of the course. A write-up that included purpose, procedure, data, and conclusion was required. Subjects included butterflies and moths, fossils from stone quarries, leaves of native trees, and plants. Some of these collections (*e.g.*, plants on herbarium sheets) were saved as resources for use during the regular school year.

During the fourth week we related evolution to a study of the fossil plant and animal life of the region. Stone quarries provided marine life of the Devonian Period, and a riverbank provided plants of the Pennsylvanian. Geology picks were used to aid in collecting.

A field trip to Rock Island waterworks and sewage-treatment plants was tied in with the study of bacteria and their ecologic importance. Water pollution tests were made on samples brought in by students from ponds and streams.

After observing adaptations in organisms of field and stream and individual variation within a species, we took up a study of individual and population genetics to see how these variations come about and are increased, maintained, or decreased in relation to their usefulness in the present environment, random or selective mating, size of population, rate of mutations, and the like.

### A Camp-Out as Climax

Our final field trip was an exciting outing to a more distant state park for a two-day camp-out. Students had a fine experience in camping, cooking, and campfire fun. A fee was charged for food. Instructors bought the food, but students prepared it, gathered firewood, and put up their own tents. Each student brought his own eating utensils (labeled with his name) and was responsible for cleaning them. On this final trip we reviewed, on the next-to-last day, the plant and animal life we had seen through the summer. On the final day a field practical exam was given to small groups by each instructor: two instructors gave the exam section on aquatic life, while two other instructors gave the exam section on nonaquatic life.

## SUGGESTIONS FOR CONTRIBUTORS

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In matters of punctuation, enumeration, and the like we follow generally the above-mentioned C.B.E. manual and the University of Chicago *Manual of Style*. Our spellings are usually those preferred by *Webster's Third New International Dictionary* (G. & C. Merriam Co., 1965) and its abridgments.

Avoid footnotes of any kind. References to the literature are made on-line (not by means of superscripts) within the text. If only one, two, or three works are cited, each is given in full, in the form "A. B. Smith, *Elements of biology*, 4th ed., 1969." If four or more works are cited, they are presented at the end of the article as a bibliography arranged alphabetically by (principal) authors' last names, in the following forms for books and journals:

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White, W. X., and Y. Z. Green. 1965. The inquiry process. *Journal of Pedagogy* 7 (2): 53-56.

(Note that publishers' names and addresses are omitted and that names of periodicals are not abbreviated.) Refer-

## Conclusions

The double problem of too many students and too-short class periods can be solved by the summer field-biology course.

By having at least two instructors, a better cross-section of knowledge of field life can be conveyed. For example, the instructor who knows birds best can take some students out for birds while the instructor who knows plants best is taking the rest of the students out for plant study; and next day the groups switch.

The instructors need not apologize for not knowing all species of plants and animals in an area. The great variety of species should be pointed out and the value of identification keys should be stressed. For subjects in which the instructors have little background, other people who are authorities can be brought in; thus, we were aided by a geology professor from a local college. Or perhaps your State Geological Survey will provide a paleontologist.

Field biology is an exciting course to teach and an exciting way to learn. In this kind of course the teacher can really get to know his students, and the students can really get to know the life around them. "This is the only way to learn," one of our students said.

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